



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,047	08/11/2008	Herve Toulhoat	PET-2254	6857
7590 11/17/2011 Millen, White, Zelano & Branigan 2200 Clarendon Boulevard Suite 1400 Arlington, VA 22201				
EXAMINER WONG, EDNA				
ART UNIT		PAPER NUMBER		
1759				
MAIL DATE		DELIVERY MODE		
11/17/2011		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

ADVISORY ACTION

This is in response to the Amendment After Final dated November 14, 2011. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office Action.

Response to Arguments

Claim Rejections - 35 USC § 112

I. Claims **1-27** have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection of claims 1-27 under 35 U.S.C. 112, second paragraph, has been withdrawn in view of Applicants' amendment.

II. Claims **1-27** have been rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: between steps (a) and (b).

The rejection of claims 1-27 under 35 U.S.C. 112, second paragraph, has been withdrawn in view of Applicants' amendment.

Response to Amendment

Claim Rejections - 35 USC § 112

I. Claims **1-27** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

lines 2-3, "the liquid phase" lacks antecedent basis.

Antecedent basis must be laid for each recited element in a claim, typically, by introducing each element with the indefinite article ("a" or "an"). *See Slimfold Mfg. Co. v. Kincaid Properties, Inc.*, 626 F. Supp 493,495 (N.D. Ga. 1985), *aff'd*, 810 F.2d 1113 (Fed. Cir. 1987) (*citing* P. Rosenberg, 2 *Patent Law Fundamentals*' § 14.06 (2d. Ed. 1984)). Subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

lines 8-9, recite "with the provision that in (iii) and (iv) absorbed CO₂ in the aqueous phase is transferred to a water-insoluble ionic liquid medium" lacks antecedent basis. There is no absorbed CO₂ in the aqueous phase recited in (iv).

Claim 2

line 2, it appears that "liquefying said CO₂" is the same as the liquefying CO₂ in

the liquid phase under pressure up to the supercritical state recited in claim 1, lines 3-4. However, the claim language is unclear as to whether it is.

The subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

It is suggested that "liquefying said CO₂" be amended to -- the liquefying of said CO₂ --.

line 3, it appears that the "pressure" is the same as the pressure recited in claim 1, line 4. However, the claim language is unclear as to whether it is.

The subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

Claim 3

lines 2-3, it appears that "absorbing CO₂ in a polar aprotic liquid, not miscible with water or miscible with water in various proportions" is the same as the absorbing CO₂ in a polar aprotic liquid, not miscible with water, or miscible with water in various proportions recited in claim 1, lines 4-5. However, the claim language is unclear as to whether it is.

The subsequent mention of an element is to be modified by the definite article

"the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

It is suggested that "absorbing CO₂ in a polar aprotic liquid, not miscible with water, or miscible with water in various proportions" be amended to -- the absorbing of the CO₂ in the polar aprotic liquid, not miscible with the water, or miscible with the water in various proportions --.

Claim 6

lines 2-3, it appears that "absorbing CO₂ in an aqueous phase containing an alcohol and/or an amine" is the same as the absorbing CO₂ in an aqueous phase containing an alcohol and/or an amine recited in claim 1, line 6. However, the claim language is unclear as to whether it is.

The subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

It is suggested that "absorbing CO₂ in an aqueous phase containing an alcohol and/or an amine" be amended to -- the absorbing of the CO₂ in the aqueous phase containing the alcohol and/or the amine --.

Claim 7

lines 2-3, it appears that "absorbing CO₂ in a hydrated form being activated by an

enzymatic pathway" is the same as the absorbing CO₂ in the hydrated form in a solvent, activated by an enzymatic pathway recited in claim 1, line 7. However, the claim language is unclear as to whether it is.

The subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

It is suggested that "absorbing CO₂ in a hydrated form being activated by an enzymatic pathway" be amended to -- the absorbing of the CO₂ in the hydrated form being activated by the enzymatic pathway --.

Claim 11

lines 1-2, "the aqueous solution" lacks antecedent basis.

II. Claims 1-27 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: between steps (a) and (b).

Claim 1

lines 1-18, recite:

A process for sequestering carbon in the atmosphere, comprising:

a) a step for concentrating CO₂ in the liquid phase, said step comprising any of the following: (i) liquefying CO₂ in the liquid phase under pressure up to the supercritical state; (ii) absorbing CO₂ in a polar aprotic liquid, not miscible with water, or miscible with water in various proportions; (iii) absorbing CO₂ in an aqueous phase containing an alcohol and/or an amine; (iv) absorbing CO₂ in the hydrated form in a solvent, activated by an enzymatic pathway, with the provision that in (iii) and (iv) absorbed CO₂ in the aqueous phase is transferred to a water-insoluble ionic liquid medium;

b) a step for electro-reduction of resultant liquid phase containing liquid or absorbed CO₂ in an aprotic medium to oxalic acid or formic acid in which the carbon changes to oxidation number +3;

c) if appropriate, a step for extracting said oxalic acid or formic acid in an aqueous phase; and

d) a step for mineralization by reacting said oxalic acid or formic acid with a carbonate of an element M, producing a mineral in which the atomic ratio C/M is about 2/1, wherein M is any metallic element with an oxidation number of +2, and C is carbon, and wherein the oxalic acid and formic acid are in an acid or salt form.

The resultant liquid phase containing liquid or absorbed CO₂ recited in the electro-reduction step (b) that is to be modified is not the subsequent mention of an element that is earlier recited. Thus, there is no relationship between steps (a) and (b).

The subsequent mention of an element is to be modified by the definite article "the", "said" or "the said," thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation.

III. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: between step (a) in claim 1 and step (a) in claim 4.

Claim 1

lines 2-9, recite:

"a) a step for concentrating CO₂ in the liquid phase, said step comprising any of the following: (i) liquefying CO₂ in the liquid phase under pressure up to the supercritical state; (ii) absorbing CO₂ in a polar aprotic liquid, not miscible with water, or miscible with water in various proportions; (iii) absorbing CO₂ in an aqueous phase containing an alcohol and/or an amine; (iv) absorbing CO₂ in the hydrated form in a solvent, activated by an enzymatic pathway, with the provision that in (iii) and (iv) absorbed CO₂ in the aqueous phase is transferred to a water-insoluble ionic liquid medium."

Claim 4

lines 1-3, recite:

"characterized in that step a) for concentration in the liquid phase comprises absorbing CO₂ in an aprotic ionic liquid not miscible with water or miscible with water in various proportions."

It is unclear how step (a) in claim 4 is further limiting step (a) in claim 1.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject

matter:

Claims 1-27 define over the prior art of record because the prior art does not teach or suggest a process for sequestering carbon in the atmosphere comprising the steps of (a) concentrating, (b) electro-reduction, (c) if appropriate, extracting and (d) mineralization as presently claimed, esp., the step for mineralization by reacting said oxalic acid or formic acid with a carbonate of an element M, producing a mineral in which the atomic ratio C/M is about 2/1, wherein M is any metallic element with an oxidation number of +2, and C is carbon, and wherein the oxalic acid and formic acid are in an acid or salt form. The prior art does not contain any language that teaches or suggests the above.

Abbott et al. do not teach a step for mineralization by reacting oxalic acid or formic acid with a carbonate of an element M, producing a mineral in which the atomic ratio C/M is about 2/1, wherein M is any metallic element with an oxidation number of +2, and C is carbon, and wherein the oxalic acid and formic acid are in an acid or salt form.

CS 111531 does not teach reacting oxalic acid or formic acid with a carbonate of an element M.

Therefore, a person skilled in the art would not have been motivated to adopt the above conditions, and a *prima facie* case of obviousness cannot be established.

Claims 1-27 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDNA WONG whose telephone number is (571)272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey T. Barton can be reached on (571) 272-1307. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edna Wong/
Primary Examiner
Art Unit 1759

EW
November 16, 2011